

Maria Prat Colomer

PhD student in Mathematics

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RESEARCH INTERESTS Partial Differential Equations, Computer-Assisted Proofs and Machine Learning.

EDUCATION

PhD in Mathematics *Brown University, US*
SEPT 2024 - Current
Advisor: Prof. Javier Gómez-Serrano

Master's degree in Advanced Mathematics and Mathematical Engineering *UPC, Spain*
SEPT 2023 - JUNE 2024
Advisor: Prof. Javier Gómez-Serrano and Prof. Tere M-Seara.
Master thesis (with honors): Machine learning methods in incompressible fluid dynamics.

Visiting student *NYU, US*
SEPT 2022 - JUNE 2023
Advisor: Prof. Joan Bruna.
Bachelor thesis (with honors): Multiscale modeling of a closure problem using the scattering transform.

Bachelor's degree in Mathematics *CFIS-UPC, Spain*
SEPT 2018 - JUNE 2023

Bachelor's degree in Informatics Engineering *CFIS-UPC, Spain*
SEPT 2018 - JUNE 2023

RESEARCH EXPERIENCE

Polytechnic University of Catalonia *Research Assistant*
SEPTEMBER 2023 - AUGUST 2024
Barcelona, Spain
Physics-Informed Neural Networks (PINNs) for computer-assisted proofs in partial differential equations, with Prof. Tere M. Seara and Prof. Javier Gómez-Serrano (Brown University)

New York University *Visiting Student*
SEPTEMBER 2022 - JUNE 2023
New York, United States of America
Scattering representations to develop subgrid parametrizations in climate and turbulence models, with Prof. Joan Bruna. Affiliated to [M2LinES project](#) led by Prof. Laure Zanna

Barcelona Introduction to Mathematical Research 2022 Summer Program *Student*
JULY 2022
Barcelona, Spain
Physics-Informed Neural Networks (PINNs) for computer-assisted proofs in partial differential equations, with Prof. Javier Gómez-Serrano (Brown University)

ICFO - The Institute of Photonic Sciences *Research Assistant*
MARCH 2021 - JUNE 2021
Castelldefels, Spain
Monte Carlo methods for the Zauner's Conjecture, in the Quantum Information Theory group led by Prof. Antonio Acín

Centro de Astrofísica da Universidade do Porto *Research Assistant*
JULY 2017, JULY 2018
Porto, Portugal
Statistical and astronomical tests for class of models of the dark energy equation of state, with Prof. Carlos Martins

PUBLICATIONS

[Google Scholar](#)

- 2022 **M. Prat Colomer**, L. Mortimer, I. Frérot, M. Farkas and A. Acín. *Three variational approaches to find sets of mutually-unbiased bases*. In Quantum 6, 778
- 2019 Martins, C. J.A.P. and **M. Prat Colomer**. *Fine-structure constant constraints on late-time dark energy transitions*. In Physics Letters B 791, pp. 230-235
- 2018 Martins, C. J.A.P. and **M. Prat Colomer**. *Constraining late-time transitions in the dark energy equation of state*. In Astronomy & Astrophysics (A&A) 616, A32

INVITED SEMINAR TALKS

- Brown**, GLESPA seminar. *Computer-assisted proofs in ODEs and PDEs*. October 2024.
- UChicago**, Prof. Hassanzadeh's group seminar. *Multiscale modeling of a closure problem using the scattering transform*. February 2024.
- NYU**, Prof. Joan Bruna's group seminar. *Multiscale modeling of a closure problem using the scattering transform*. May 2023.

WORKSHOPS

- Mathematics and Machine Learning Program** October 21-25, 2024 at CMSA - Harvard
- Computer-Assisted Proofs in Nonlinear Analysis** September 5-13, 2024 at CRM - Université de Montréal

WORK EXPERIENCE

- Google** SRE Intern
JULY 2021 - SEPTEMBER 2021 Remote - Dublin, Ireland
Feature extraction from generic datasets to obtain relevant features for anomaly detection ML models
- Google** STEP Intern
JULY 2020 - SEPTEMBER 2020 Remote - Zurich, Switzerland
Open-source tool to replace resource-intensive components without compromising test integrity and validity

SELECTED ACCOMPLISHMENTS

- CFIS Scholarship** 2018 - 2023
Tuition and residence scholarship to simultaneously study two Bachelor's degrees
- Maria Yzuel Fellowship Award - SPIE@ICFO** 2021
- Bronze medal and First Girl Prize - Catalan Olympiad in Informatics** 2018
- Bronze medal - Iberoamerican Olympiad in Informatics** 2018
- Recognition for the university entrance exams - Catalan Government** 2018
- Youth and Science Program - Catalunya La Pedrera Foundation** 2016-2018
- CIMs+CELLEX Scholarship - Cellex Foundation** 2016-2018
Tuition and residence scholarship to simultaneously study the Spanish and the International Baccalaureates
- International Baccalaureate Diploma Programme (IB)** 2016-2018
Scored 44 out of 45 points with High Level in Mathematics and Physics (top 1.23% of candidates worldwide)

LANGUAGES Catalan (mother tongue), Spanish (mother tongue), English

PROGRAMMING LANGUAGES Python (JAX, Pytorch, Tensorflow), C/C++, Java, GoLang, R, MATLAB, SQL